

a visit to Robert Brown just before his death. "He talked quite calmly and cheerfully, recalling the days when he had sat in the same room in company with Banks, Solander and Dryander, and telling her *where* each of them used habitually to sit." There is, too, a striking letter (ii., 53), written apparently before Hofmeister's discoveries had reached him, in which Sir Charles argues for the connection of the Exogens with the Cryptogams by means of the Conifers, and (ii., 56) for the common nature of spores and pollen-grains.

In 1866 he noted down (ii., 214) the influences which he believed to have guided his development. Four books are mentioned:—(1) Plutarch's "Lives,"¹ which he valued as teaching magnanimity; (2) Hallam's "Constitutional History"; (3) Lyell's "Principles"; (4) Lindley's "Natural System of Botany." The two men of whose influence he speaks are Sir William Napier, "a great genius and a noble though singular character," and Sir George Napier, with whom he stayed at the Cape, "one of the most interesting and most profitable years of my life."

He died in 1886, aged seventy-seven; few men can have lived a long life more kindly and wisely.

F. D.

HAILEYBURY NATURAL HISTORY LECTURES.

Life and Evolution. By F. W. Headley. Pp. xvi+277; illustrated. (London: Duckworth and Co., 1906.) Price 8s. net.

THIS well-illustrated and attractive volume, according to the preface, is the final form assumed by a series of lectures delivered before the members of the Haileybury Natural Science Society, the great majority of whom are scholars at the famous Hertfordshire school. From the very nature of the case it aims, therefore, at being intelligible to readers unprovided with a large store of scientific knowledge of their own. It will be equally self-evident that it does not lay claim to be a new gospel. Rather is it an attempt, if we rightly understand its purport, to place before that section of the public which possesses a thirst for scientific knowledge a clear idea of the general structure and mutual relationships of the leading groups of animals and their adaptations to various modes of life, to show in what respects animals resemble and differ from plants, and how to distinguish between these two great primary groups of organisms, and, finally, to attempt a solution of the riddle of the evolution of organic life and of the human intellect.

The task is, of course, a heavy one, and one bristling with difficulties, but if we take into consideration the class to whom he is specially appealing and the amount of space available, we consider that Mr. Headley has come well out of the ordeal. It is not to be supposed that all his opinions will be accepted by each one of his readers, but in most cases, at any rate, he has expressed himself on de-

¹ Fortunately for himself he read it in Langhorne's translation, so that he could peruse and re-peruse it so as almost to know it by heart. A boy of thirteen would never have got the essential good of the book if he had known it only in the original.

batable points with fairness and moderation, and he does not assume the character of an *ex parte* advocate. The great test of a work of this nature is whether it suits the taste of the class of readers for whom it is intended, and in the few instances in which we have been able to put this test to the proof the verdict is favourable. The style and mode of expression are almost everywhere good and interesting, and in all cases free from unnecessary technicalities, while the prevailing tone is that of a thoughtful lover of nature in all its forms. The illustrations speak for themselves.

Passing over the first chapter, which is devoted to the relationships and dissimilarities of plants and animals, attention may be directed to certain speculations in the second chapter—on the sea and its inhabitants—with respect to sedentary animals, which are regarded as having reverted to a semi-plant-like mode of existence. It is pointed out that such sedentary animals are much more numerous in the shore-waters than elsewhere. This the author believes is due to the movements of tides and currents, which bring ample food supplies without the need of any active exertion on the part of the recipients. How comes it, then, that almost all classes of sedentary animals are also well represented in the ocean-abysses, where no such free distribution of supplies takes place? The answer to the puzzle is, in the author's opinion, to be found in the fact that many of the abyssal organisms are stalked, and that they obtain nutriment by possessing the power of bending these stalks, and thus being endowed to a certain limited degree with motion. The proof that this power exists has, however, in many cases yet to be demonstrated. With regard to polyzoans and corals, the suggestion is that they may be fed by a rain of organic debris descending from the surface-waters.

Gills and lungs form the subject of the third chapter, in which reference is made to the occurrence in that hobgoblin-like fish, the Malay Periophthalmus, of an accessory breathing organ in the tail, by the aid of which the creature is enabled to spend much of its time out of water. The various phases of the respiratory function are shown to form an excellent instance of evolution, diffused breathing by the whole surface of the body giving place first of all to localised respiration by means of gills, and these again yielding to lung-breathing in the more active terrestrial forms, some of which have reverted, however, to the water, the ancestral home of all animal life.

Reptiles and their kin and the evolution of the reptile into the bird are discussed at length in the next two chapters. In seeking to find an explanation for the tendency to union between bones originally distinct, which forms such a marked feature of the avian skeleton, Mr. Headley suggests that the fusion of the tarsus with the long bones of the lower part of the legs has taken place in order to strengthen the automatic, pulley-like action of tendons which enables a bird to remain securely perched while asleep. The suggestion seems well founded. Later on we are told how the peculiar, saddle-like articulations of the cervical vertebræ enable birds to bend their necks in

that supple manner which attains its maximum development in the darter, or "snake-bird." Having so carefully described this feature, it is a little surprising that the author has permitted his artist to reproduce in the plate facing p. 80 the old conventional restoration of a plesiosaur with its neck bent into a swan-like curve, when, from the form of the articular surfaces of the vertebræ, it is manifestly impossible that such a flexure could have been assumed. The power of neck-flexure is evidently a specialised feature due to a long process of osteological evolution.

A statement on p. 252 is another thing which the author on reflection would probably like to amend. It is there stated that the *chamæleon* keeps its tongue "rolled up (the only way of pushing its monstrous length in his mouth)." This is scarcely in accord with Dr. Gadow's explanation of the mechanism. "The elastic part of the tongue," writes that authority, "is, so to speak, telescoped over the style-shaped copula, and the whole apparatus is kept in a contracted state like a spring in a tube."

Exception may likewise be taken to certain statements in connection with the fossil vertebrates of Patagonia on p. 222. For instance, the author definitely states that the "strange hoofed animals have their nearest allies in the hyrax," whereas it is only a suggestion that one group of these ungulates might have affinity with the hyraxes, and this is discredited by Dr. Andrews. Again, although it may be permissible to allude to the *megatherium* as the *megalo-thera*, it is certainly wrong to style it the "*megalo-thera*"; while to write that the *seriema* (not *siriema*) had a skull as large as that of a horse displays great want of knowledge.

The author has much of interest to say with regard to the nature of feathers and the flight of birds, which is one of his favourite subjects, while in the final three chapters he takes into consideration the minds of men and animals, the struggle for existence, and natural selection, including under the later heading the evolutionary theories of Darwin, de Vries, Mendel, and others. To review these chapters, interesting as they are, is, however, unfortunately impossible within our allotted space. We must accordingly bring this notice to a somewhat abrupt close by reiterating our opinion that the author has succeeded in producing a very readable and thoughtful book, which deserves a large *clientèle* of readers.

R. L.

MEDICAL INSPECTION OF SCHOOL CHILDREN.

The Health of the School Child. By Dr. W. Leslie Mackenzie. Pp. vi+120. (London: Methuen and Co., n.d.) Price 2s. 6d.

IN the Education Bill now [last October] before Parliament, a clause has been inserted to make medical inspection obligatory in all English State-aided schools" (p. vi.) "In their Scottish Education Bill of last year (1904) the Government included provision for the medical examination and supervision of

school-children. . . . The examination of school-children is, therefore, no longer a question of doubtful politics. . . . It has now all but passed into the region of administration. . . ." (p. 53).

This stage having at length been reached in our own country, we can follow Dr. Mackenzie with all the more readiness and interest to Wiesbaden, and listen to his account of the medical inspection of schools as he found it carried on there. In this town, he tells us, there are some 10,000 elementary school-children who are under the supervision of seven specially appointed school doctors, each receiving an average stipend of about 40*l.* per annum. The school doctor has to examine every child when it enters and leaves the school, and during its third, fifth, and eighth school years. He rejects those who are unfit for school attendance, he notifies defects to the parents, and he may give them advice as to treatment. He visits the school for about an hour every fortnight in order to deal with current cases of ill-health.

Dr. Mackenzie describes how, on the occasion of one of his visits, he found the doctor examining thirty-five newly-entered children, observing the state of their nose, eyes, skin, bones, joints, spine, heart, lungs, and the presence or absence of hernia, measuring the chest, testing their speech, eyesight and hearing, and recording these various conditions on specially scheduled cards. The doctor "seemed to be readily welcomed by the teachers, and was sometimes waited for by the parents, who wished to get his personal opinion of the children" (p. 10)—an appreciation arguing diligent obedience to the two following regulations, which are issued in all Teutonic gravity to the school doctors. "In the filling in of the particular form (notifying ill-health to the parent) all harshness and rudeness of expression are to be avoided" (p. 94). "In reference to the teaching, the doctor is warned that he should tactfully avoid all exposure of a teacher before his class" (p. 93)!

But the current of our admiration slackens when Dr. Mackenzie tells us that the inspection of the thirty-five new children in the above manner occupied only an hour and a half. It is difficult to believe that an examination of so wide a scope thus rapidly conducted can be of great value. Practice, of course, brings speed, but not even the greatest expert could satisfactorily make such a detailed study of school-children, giving an average of less than three minutes to each individual. Eyesight and hearing alone could hardly be tested in that interval.

"When one reflects that from twenty to thirty per cent. of our school-children in Scotland suffer from eye defects needing correction or attention" (p. 81), we may reasonably doubt the policy of introducing into the United Kingdom this German system of school inspection without modification.

The German system should surely be modified in the direction of lightening the doctor's burden. Inasmuch as "Dr. Kerr, of the London County Council, found that with a little care the teachers were able to find out almost all the children that suffered from eye defects" (p. 82), there is no reason why teachers should not be trained and required to test periodically